

# The African migration and wintering grounds of the Aquatic Warbler *Acrocephalus paludicola*

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## Summary

There is a clear need for protection of the migration and wintering grounds of the Globally Threatened Aquatic Warbler *Acrocephalus paludicola*, but little is known about them and the threats they face. To narrow this gap, a desk study was performed between May 1998 and October 2004. Information on known wintering grounds was sought by means of questionnaires, personal communications, ringing data, publication and internet searches. Results show that the Aquatic Warbler has so far been recorded in nine African countries, but with recent records since 1980 from only five countries (Egypt, Ghana, Mauritania, Morocco and Senegal). All present data suggest that the Aquatic Warbler migrates through north-west Africa in autumn and spring, with the wintering grounds limited to wetlands of western sub-Saharan Africa, with verified records only from Mauritania, Mali, Senegal and Ghana during the months of August to April. The species was almost always found in habitats similar to that of its breeding grounds, i.e. in *Carex*, *Juncus* or *Phragmites* (sedge, rush and reed) associations, but also in dense grasses, shrubs and other vegetation found in freshwater marshes, flooded or wet meadows, and along the edges of backwaters, flood basins, lagoons, lakes, ponds, rivers and wadis. Recent research suggests that at least some Aquatic Warblers may actually winter further south than the present data suggest, in countries such as The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo and Benin, or maybe even in so far unexplored wetlands in Central or East Africa. Because wetlands throughout Africa face imminent threats from agricultural and tourist development, more fieldwork is urgently needed to further pinpoint the migration and wintering grounds of the Aquatic Warbler.

## Introduction

The Aquatic Warbler *Acrocephalus paludicola* is classified as Vulnerable by BirdLife International (2004) and is thus the most threatened passerine of continental Europe. Although much is known about its Palearctic breeding grounds, the same cannot be said of its African migration and wintering grounds. The published species action plan (Heredia *et al.* 1996) and recent updates of this original plan (Aquatic Warbler Conservation Team 1999, Convention on Migratory Species 2003) regard the threat of habitat loss in winter quarters as unknown and the need for protection of this species' winter habitats as high. While the protection and active management of key breeding grounds of the Aquatic Warbler (e.g. in Belarus) has been quite successful (BirdLife International 2004), a fundamental threat to the survival of this habitat specialist could still lie in the wintering grounds and potentially destroy the conservation success in the breeding grounds.

A desk study into the African wintering grounds of the Aquatic Warbler was initiated in May 1998 and finished in October 2004. The aim was to collect all available records, in the hope that with more information of winter quarters available, more can be done to conserve this threatened species. Despite the considerable effort of this desk study, we do not consider our findings as conclusive but hope that this report will promote further discussion and study. We would like to ask anyone who has any additional information about the wintering grounds of the Aquatic Warbler to contact us.

## Methods

### *Data acquisition*

We designed a short questionnaire and sent it to a wide range of African contacts that included BirdLife Partners and BirdLife Representatives, Wetlands International Country Co-ordinators, private individuals with expert African knowledge and natural history museums. A literature search was conducted and details sought of ringing recoveries in any African country. We also contacted tour operators who run holidays in the relevant areas and members of the African Bird Club. We further carried out an internet search. Around 100 requests for information were made, and the response was very encouraging at around 50% (see Acknowledgements). In addition to these efforts, a research project at the Zoological Museum, University of Copenhagen (Walther and Rahbek 2002) also acquired information by contacting over 200 individuals or organizations via mail, e-mail or telephone requesting data or references. Almost 100 people and almost all European and African ringing schemes responded and sent data, references or contact addresses (see Acknowledgements).

### *Data entry*

We entered each record into an ACCESS database with the following information:

- Sex (unknown, male or female).
- Age (using the official EURING codes).
- Number of individuals recorded (if no information was given on the number of individuals, the entry was always “equal to or greater than 1”);
- Reliability of record, classified as (1) specimen collected, (2) bird caught and released, (3) published record and (4) unpublished record; in categories 3 and 4, we further distinguish between “observed” records (i.e. the species was visually observed) and “recorded” records (i.e. the species was recorded but we do not know how).
- Habitat: we tried to stay as close to the original description as possible, but usually edited and, in many cases, translated the habitat descriptions of the original sources.
- Date.
- Locality.
- Geographical coordinates of each locality were established as follows: if the source did not provide coordinates, we consulted the *Times Atlas* (Bartholomew 1956, Anonymous 2001), various other printed gazetteers, or the internet-based gazetteer of the National Imagery and Mapping Agency (2003); if these modern

Table 1. Records of the Aquatic Warbler per decade for three regions (in our case, Macaronesia refers to the Azores and Canary Islands).

Decade	Macaronesia	Africa	Middle East	Total
1860s	–	– (2?)	–	– (2?)
1870s	–	1	–	1
1880s	–	–	–	–
1890s	–	–	–	–
1900s	1	– (1?)	–	1 (1?)
1910s	–	2	–	2
1920s	–	1	–	1
1930s	1	1	–	2
1940s	–	2	–	2
1950s	–	7	–	7
1960s	–	11	1	12
1970s	1	31 (1?)	–	32 (1?)
1980s	4	24 (1?)	–	28 (1?)
1990s	3	35	1	39
2000s	–	4	–	4
Total	10	119 (5?)	2	131 (5?)

Records in parentheses with a question mark denote those records where we made a best guess at the date of the record, although this was not possible for two records from Tunisia; we also *a priori* excluded five other records (see Appendix for details).

gazetteers provided better coordinates than the original sources, we corrected the coordinates provided by the original sources.

- Sources (published references or persons who communicated the record).

## Results

### *Aquatic Warbler records per decade*

Table 1 shows the total number of African, Macaronesian and Middle Eastern records per decade beginning with the 1860s. During the nineteenth century, Aquatic Warblers were recorded only in Morocco (Drake 1867), Egypt (von Heuglin 1869) and Algeria (Gurney 1871). Records from Africa were also scarce during the first half of the twentieth century. In the second half of the twentieth century, however, records started to pick up once ringing programmes and atlas work were started in the 1970s and resulted in a substantial increase in observations. Since 2000, only four Aquatic Warblers have been recorded, either because the observational effort has declined, the species has declined, or the most recent records have not reached us yet.

### *Aquatic Warbler records country by country*

We tried to obtain information for all African, Macaronesian and Middle Eastern countries that may provide migration and wintering grounds for the Aquatic Warbler. To the best of our knowledge, Aquatic Warblers have been recorded in only nine African countries (Algeria, Egypt, Ghana, Mali, Mauritania, Morocco, Senegal, Tunisia and Western Sahara), the Canary Islands, and two Middle Eastern countries (Jordan and Turkey). The records country by country are the following (for details, see Appendix and Table 2):

Table 2. Migration of the Aquatic Warbler across African countries and the Canary Islands (with countries roughly arranged from north to south and east to west).

Country	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Egypt	–	–	–	2	–	–	–	1	1	1	–	5 (2)
Tunisia	–	–	–	1	–	–	–	–	1	6	1	9 (2)
Algeria	–	–	–	1	–	–	–	1	2	4	1	9
Morocco	–	1	4	4	–	–	–	7	12	9	–	37 (2)
Canary Islands	–	1	2	–	–	–	–	2	4	1	–	10
Western Sahara	–	–	1	–	–	–	–	–	–	–	–	1
Mauritania	–	1	13	12	3	1	–	1	7	2	–	40
Mali	–	–	–	–	2	3	–	–	–	–	–	5
Senegal	–	–	–	–	–	4	2	4	5	–	–	15 (1)
Ghana	–	–	–	–	1	–	–	–	–	–	–	1
Total	–	3	19	20	6	8	2	16	31	23	2	132 (7)

For each month, the number of records in the respective country is given. The total number of records for each month is given in the bottom row, and the total number of records for each country is given in the last column, with the number of records that were excluded or without information on month given in parentheses (see Appendix for details). The records from the Azores, Cyprus, Jordan and Turkey are not included.

**Algeria:** One very old and undocumented record from Laghouat (Gurney 1871), an old specimen from Touggourt, and seven more recent records at Réghaïa in February, April, May and October (Ledant *et al.* 1981).

**Azores:** Listed as “accidental” in Cramp (1985–1992) and Snow and Perrins (1998). The likely source of this record is the *Birds of the Western Palearctic* contact person at the time, Gerald Le Grand, Universidade dos Acores in Ponta Delgada (Mike Wilson *in litt.* 2004). However, no official record has been registered with the Portuguese Rarities Committee (Gonçalo Elias *in litt.* 2004), so this record remains unconfirmed.

**Canary Islands:** Ten records during the months of August, September, February, March and April (Martín and Lorenzo 2001). Bannerman (1920) also mentions an old record (Webb *et al.* 1842) giving Gran Canaria as the species’ habitat, but without any further information, so that Martín and Lorenzo (2001) consider this record as doubtful.

**Cyprus:** Only one unconfirmed record (Flint and Stewart 1992).

**Egypt:** Two very old, undated and undocumented records, one describing the species as “occasional” during the winter in lower Egypt (von Heuglin 1869) and another one as “fairly common” in the Nile Valley (Whymper 1909), and another five records between 1943 and 1992. Goodman and Meininger (1989) reject the Aquatic Warbler from the Egyptian list because “specimen, photographic, or observational details are lacking, vague, or at fault”, but without giving a detailed argument. Given the number of records and Meiklejohn’s (1944) statement that “the bird, which moreover can scarcely be confused with any other warbler, was very tame and excellent views of it were secured”, we cautiously include these records in our analysis.

**Ghana:** One record in November (Hedenström *et al.* 1990, Bensch *et al.* 1991).

**Jordan:** One record in May (Andrews 1995).

**Mali:** Five records in November and December (Lamarche 1981, B. Lamarche *in litt.* 2004).

**Mauritania:** Forty records from August–December and February–April (Lamarche 1988, B. Lamarche and V. Salewski *in litt.* 2004).

**Morocco:** About 37 records from August–October and February–April (most likely more, as data often refer to “many” but do not specify exact numbers). The species was first collected near Tangier in March 1867 (Drake 1867) and caught near Essaouira in September 1911 (Lozano 1911), and was regularly sighted during autumn and spring passage at Ras El Ma and the Mouloya estuary in the 1950s (Brosset 1956, 1961, Thévenot *et al.* 2003). Most of the remaining records stretching from 1963 to 1998 are summarized in Thévenot *et al.* (2003).

**Senegal:** About 15 records from December–March (most likely more, as data often refer to “many” but do not specify exact numbers) together with one undated record, all from inside the Djoudj National Park where several ringing programmes were conducted.

**Tunisia:** Nine records from October and March–May, together with one undated and undocumented “summer” record (Heim de Balsac and Mayaud 1962). The earliest records are specimens collected by the hunter-naturalist Blanchet in 1917 and 1932 (Blanchet 1955, Thomsen and Jacobson 1979), with six further records between 1949 and 1969. Gouttenoire (1955) described the species as a “regular” migrant.

**Turkey:** One specimen was held in the Robert’s College collection (Istanbul) but has been lost (Kirwan 1997). Unsupported records concern one (or several) autumn specimens given to Braun, observations around Izmir (without dates) and one individual sighted by Smith west of Trabzon in June 1958 (Kumerloeve 1961). The only verifiable record is of one individual observed near Anamur on 5 September 1991 (Kirwan 1992, 1995).

**Western Sahara:** One record of an individual landing on a ship on 1 September 1962 near the Western Saharan coast (Stam and Voous 1963, Tuck 1964).

For the following countries, no records were found in the relevant publications and no records came forth from answers to our questionnaire: Angola (Harrison *et al.* 1997); Benin (Green and Sayer 1979); Botswana (Newman 1992); Chad (Salvan 1967–1969); Congo (Urban *et al.* 1997); Djibouti (Ash 1985); Ethiopia (Urban *et al.* 1997); Equatorial Guinea (Serle *et al.* 1977); Gabon (Brosset and Erard 1986); The Gambia (Gore 1990); Guinea-Bissau (Serle *et al.* 1977); Ivory Coast (Thiollay 1985); Kenya (Britton 1980); Libya (Bundy 1976); Liberia (Gatter 1997); Lesotho (Ambrose and Maphisa 1999); Mozambique (Newman 1992); Namibia (Urban *et al.* 1997); Niger (Giraudoux *et al.* 1988); Nigeria (Elgood *et al.* 1994); Somalia (Ash and Miskell 1998); South Africa (Newman 1992, Harrison *et al.* 1997); Swaziland (Newman 1992); Togo (Cheke and Walsh 1996); Uganda (Urban *et al.* 1997); Zaire (Urban *et al.* 1997); Zambia (Benson *et al.* 1971); and Zimbabwe (Irwin 1981). For the following countries, no records were found in the relevant publications and no reply was received to our questionnaire: Burkina Faso (Green and Sayer 1979); Burundi (Gaugris 1981); Cameroon (Louette 1981); Central Africa Republic (Carroll 1988); Eritrea (Smith 1957); Guinea (Morel and Morel 1988); Malawi (Newman *et al.* 1992); Rwanda

(Schouteden 1966); Sierra Leone (Urban *et al.* 1997); Sudan (Nikolaus 1987); and Tanzania (Britton 1980).

#### *Aquatic Warbler records by month*

Table 2 shows that the Aquatic Warbler has never been observed in Africa or Macronesia in July (except for an undated and undocumented Tunisian “summer” record cited by Heim de Balsac and Mayaud 1962). During autumn (August–October) and spring (February–May) migration, the species has been observed in five North African countries (Egypt, Tunisia, Algeria, Morocco and Western Sahara) and the Canary Islands. However, from November through to January, the Aquatic Warbler has been recorded only in Sahel countries (Mauritania, Mali, Senegal and Ghana) with no records from countries north of the Sahel zone (except for the very old, undated and undocumented Egyptian “winter” record by von Heuglin 1869). The Aquatic Warbler reaches the northern Sahel zone in Mauritania in August, moves further south to Mali, Senegal and Ghana from November to March, and leaves the northern Sahel zone in Mauritania in April.

#### *Aquatic Warbler records by type*

Records are of three types: specimens (10 records), ringing records (24 records but most likely more, as data often refer to “many” but do not specify exact numbers), with the remaining 109 records being sight observations or unspecified records. Confusion with the Sedge Warbler *Acrocephalus schoenobaenus* is certainly a possibility for all the observational records (e.g. record 108 in the Appendix), but given the experience of most fieldworkers, this should be a minor problem.

#### *Aquatic Warbler habitats and vegetation*

In general, the descriptions of the habitats and vegetation that the Aquatic Warbler uses during migration and wintering are similar to those of its breeding grounds. It is most commonly recorded in *Carex*, *Juncus* or *Phragmites* (sedge, rush and reed) associations, but also in dense grasses, shrubs and other vegetation found in freshwater marshes, flooded or wet meadows, and along the edges of backwaters, flood basins, lagoons, lakes, ponds, rivers and wadis. Quite frequently, it has been observed in the scattered bushes and shrubs found within these habitats, e.g. in *Avicennia africana* (mangrove), *Acacia ataxacantha* (= *Mimosa pigra*), *Acacia nilotica*, *Acacia raddiana*, *Nitraria retusa*, *Salvadora persica* (mustard or toothbrush tree) and *Tamarix* sp. (tamarisks or salt cedars). On migration, it has also been observed in a reed-filled ditch, salt marshes, coastal dunes and offshore bars with *Nitraria retusa*, *Salicornia* sp. and *Tamarix* sp., vegetation around a fresh water pool in an oasis, a palm plantation, gardens (e.g. once inside a *Papyrus* stand inside a hotel garden), and even in a mosque enclosure with a single tree surrounded by desert and on an ocean-going ship.

## **Discussion**

Only a century ago, the Aquatic Warbler was a widespread species in Europe and western Siberia. The translations of two of its German common names are “sparrow

of the reeds" (Wawrzyniak and Sohns 1977) or "sparrow of the fens" (M. Flade and L. Lachmann *in litt.* 2004), suggesting how numerous this species once may have been. Most of the Aquatic Warbler's habitat was drained and destroyed in western and southern Europe during the first half of the twentieth century, and consequently the species disappeared from The Netherlands, Belgium, France, southern Germany, Italy, Yugoslavia, Bulgaria and Romania (Glutz von Blotzheim 2001). The second half of the twentieth century saw massive draining projects in the remaining core breeding area of the Aquatic Warbler, with an estimated loss of 80–90% of the total breeding habitat (Aquatic Warbler Conservation Team 1999, BirdLife International 2004, M. Flade *in litt.* 2004), taking this species to the brink of global extinction.

Curiously, however, the African records of the Aquatic Warbler do not reflect this trend. While Aquatic Warbler records were very rare until the middle of the twentieth century, when the species was still rather numerous in its breeding range, the records in Africa increased in the second half of the twentieth century (Table 1), just as European populations collapsed. These opposing trends are almost certainly the result of increased ornithological fieldwork in Africa stemming from implementing ringing programmes (e.g. Smith 1979, Loske 1990, Ottosson *et al.* 2001), the compilation of atlases and checklists (e.g. Morel and Roux 1966a–c, Thomsen and Jacobson 1979, Morel 1980, Lamarche 1980, 1981, 1988, 1993, 1994, Morel and Morel 1988, 1990, Rodwell *et al.* 1996, Sauvage and Rodwell 1998, Isenmann and Moali 2000, Martín and Lorenzo 2001, Thévenot *et al.* 2003) and the resulting increased knowledge of African migration and wintering grounds of the Aquatic Warbler.

The geographical distribution of the wintering records (Table 2) probably also partly reflects the intensity of ornithological fieldwork rather than the real distribution of the birds in winter. For example, there are more records from Djoudj National Park in Senegal than from the Niger inundation zone in Mali, although the inundation zone is a much larger and possibly more important wintering site than Djoudj National Park. Despite the obvious limitations of the present data, we can conclude that Aquatic Warblers migrate through north-western Africa in the autumn and spring but winter exclusively in the sub-Saharan Sahel zone, as no records further north are known for the months of November to January (except for the somewhat dubious Egyptian "winter" record by von Heuglin 1869).

The entire sub-Saharan distribution remains relatively obscure because of the paucity of records. At present the only verified wintering countries of the Aquatic Warbler are Mauritania, Mali, Senegal and Ghana. The Ghana record, being the most southern by more than 1.5 degrees latitude, may actually be a vagrant record of a juvenile bird overshooting the usual wintering range. However, the Ghana record may also hint at the possibility that at least some Aquatic Warblers may actually winter further south in countries such as The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo and Benin. Two lines of evidence support such a supposition. First, while birds have been observed in Mauritania and Mali in November and December, there are no January records for these countries. Unless all these birds migrate west to winter in Senegal, which seems unlikely, they probably move on to wintering grounds further south. Second, recent research on stable isotopes in moult feathers of Aquatic Warblers suggests that more easterly breeding populations (e.g. from Belarus) leapfrog more westerly breeding populations (e.g. from Poland) in their winter quarters and may winter as far south as 5 °N (Pain *et al.*

2004), which is almost 6 degrees latitude further south than the Ghana record. Therefore, there is a chance that future fieldwork in the aforementioned southern countries may find unknown wintering sites.

Finding new wintering sites further south would not only help conservation efforts but would also improve predictions from so-called inductive distribution models (Corsi *et al.* 2000). Using the available wintering records, Walther *et al.* (in preparation) modelled the sub-Saharan distribution of the Aquatic Warbler using the so-called BIOCLIM algorithm (for methodology, see Walther *et al.* 2004). The resulting distribution model suggested that suitable habitats for the Aquatic Warbler are found in a broad band stretching right across the Sahel, from the delta of the Senegal river and the Niger inundation zone all the way to Lake Chad. However, the results of this distribution model would be misleading if Aquatic Warblers have so far been overlooked in the more southern regions of West Africa.

During the autumn migration, Aquatic Warblers apparently head west/south-west via western Europe and then south through the Iberian Peninsula to West Africa (Mester 1967, Cramp 1985–1992, de By 1990, Schulze-Hagen 1993, Aquatic Warbler Conservation Team 1999, Atienza *et al.* 2001, Glutz von Blotzheim 2001). An alternative flyway has been suggested via the Middle East and Egypt south towards Lake Chad, the Salamat wetlands in south-eastern Chad, the Sudd swamps along the White Nile, the Likouala wetlands north of the Congo river, or even the vast Malagarasi-Muyovozi wetlands in north-western Tanzania, all of which are possible locations for undetected Aquatic Warbler populations. The few records from the Middle East and Egypt (see Appendix) as well as Greece and Crete (Handrinos and Akriotis 1997) may suggest such a flyway. However, despite past and present ringing projects (Dowsett 1969, Ottosson *et al.* 2002), no records from Lake Chad have emerged, nor from any other Central or East African source (see Results section). Furthermore, research on stable isotopes of moult feathers suggests that all breeding populations, even easterly ones, migrate through western Europe to West Africa (Pain *et al.* 2004). Given the present evidence, an eastern African flyway is very unlikely, and all evidence suggests that the wintering grounds of the Aquatic Warbler are indeed limited to West African wetlands. However, there remains the intriguing possibility that a hitherto unknown Siberian population of Aquatic Warbler does not migrate through western Europe towards West Africa, but through Egypt to some Central or East African wintering grounds. Only further fieldwork in these often almost inaccessible, and therefore mostly unexplored, wetlands of Central and East Africa may verify such a supposition.

Further fieldwork would not only improve knowledge of wintering sites, but also shed more light on the migration of the Aquatic Warbler. For example, M. Herremans (*in litt.* 2004) used sound-luring (including song of the Aquatic Warbler) to ground- and mist-net birds on a nightly basis from 6 April to 13 May and 29 August to 24 September 2003 in the Adrar mountains in north-central Mauritania and from 29 September to 26 October 2003 along the coast just north of Nouakchott, Mauritania. During that period, he ringed *c.* 9750 Palarctic migrants, but no Aquatic Warblers. Because the Aquatic Warbler is easily sound-lured during migration at other locations, e.g. in Belgium, these negative observations probably mean that Aquatic Warblers do not migrate during these time periods in these Mauritanian regions (or alternatively migrate in such low numbers that they have escaped capture so far, or are simply immune to sound-luring at this stage of their migration). However, V.



Salewski (*in litt.* 2004) left 51 net-metres open from approximately 08h30 to 11h00 hours on 4 September 2001 near Nouakchott in Mauritania and caught only five Palarctic migrants, but the first one was an Aquatic Warbler! These two examples illustrate that negative as well as positive records add to our knowledge of the migration of the Aquatic Warbler.

Just as on their breeding grounds, Aquatic Warblers are almost invariably associated with various wetland types on their migration and wintering grounds. Conservation of wetland habitats on breeding, migration and wintering grounds thus appears crucial for the long-term survival of this species. Wetlands throughout Africa face imminent threats from agricultural and tourist development, pollution, droughts, and invasive species (<http://www.iucn.org/themes/wetlands/map.html>). Wetlands throughout the Mediterranean, including Ramsar sites, are disappearing because of tourist development and increased extraction of drinking water (De Stefano 2004). For example, in the 1950s the Aquatic Warbler was regularly recorded in Morocco at the Ras El Ma site and the Moulouya estuary (Brosset 1956, 1961); the former does not exist anymore (M. Thévenot *in litt.* 2004) while the latter is under severe threat from planned tourist developments (De Stefano 2004) and water extraction (Snoussi 2004) but still lacks any formal protection. Likewise, the Lower Loukkos marshes, where the Aquatic Warbler was recorded in the 1980s (see Appendix), are presently without protection (Gil de Vergara and Ripoll 2001). Dams, drainage projects and the resulting agricultural intensification in the Senegal and Niger river basins have had severe adverse effects on wetland habitats (<http://www.iucn.org/themes/wetlands/map.html>), such as the succession of wet grasslands into shrubbery resulting from dams separating the grasslands from the rivers (H. Hötter *in litt.* in Schulze-Hagen 1993). However, overgrazing of wet grasslands may perhaps be the most severe threat (S. Rumsey *in litt.* in Schulze-Hagen 1993). Furthermore, habitats may be destroyed by droughts as well as irrigation, resulting in salted soils (Schulze-Hagen 1993). While exact data are not available, fieldworkers visiting the wintering grounds of the Aquatic Warbler in the 1980s and 1990s witnessed habitat deterioration and loss at an alarming pace and extent (Schulze-Hagen 1993). Therefore, wetland protection at key migration and wintering sites should not be delayed, and the underlying causes of habitat loss, such as expanding agriculture and tourism, need to be addressed.

More research is still needed to close the painful gap in the knowledge about the migration and wintering grounds of the Aquatic Warbler. It is certainly very difficult to find Aquatic Warblers in Africa through field surveys, but the results from this study and two other studies (Pain *et al.* 2004, Walther *et al.* in preparation) are narrowing down the area and the habitats in which to look for them.

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Appendix. African and Middle Eastern records of Aquatic Warbler (*Acrocephalus paludicola*) available to us in October 2004. For every record, columns contain an ID number referring to additional details for each record below the table (with an asterisk indicating that the record was excluded from our analyses for reasons given below), the date of the record, the number of individuals recorded, the habitat, the reliability of the record (1, specimen collected; 2, bird caught and released; 3, published record; 4, unpublished record), the locality and its corresponding coordinates (given as degrees and minutes latitude and degrees and minutes longitude). Note that the abbreviation "sp." may refer to one or several species (not always clearly stated in the sources).

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
<b>Algeria</b>						
1	22.3.1870-9.4.1870	≥1	Small half-dry marsh	3	Laghouat	33.48 N, 2.53 E
2	16.3.1923	1	–	1	Touggourt	33.06 N, 6.04 E
3	1.4.1977	1	Among <i>Typha</i> and <i>Phragmites</i> sp. with some sparse <i>Tamarix</i> sp. in coastal marsh located behind dunes barring the mouth of the Réghaïa wadi	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
4	17.4.1977	1	As above	2	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
5	10.10.1977	1	As above	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
6	18.2.1978	1	As above	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
7	8.4.1978	1	As above	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
8	17.4.1978	1	As above	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
9	May (1978?)	≥1	–	3	Réghaïa, 30 km E of Alger	36.45 N, 3.20 E
<b>Azores (Portugal)</b>						
10*	–	≥1	–	3	Unknown	–
<b>Canary Islands (Spain)</b>						
11	14.3.1905	1	Dense grass	3	Fuerteventura	28.23 N, 14.05 W
12	Sept. 1931	1	Barren islet	1	Isla Roque del Este, islet N of Lanzarote	29.16 N, 13.20 W
13	9.2.1974	1	Cliffs	2	Guinate, Lanzarote	29.11 N, 13.29 W
14	30.8.1983	1	–	2	Alegranza	29.23 N, 13.30 W
15	4.4.1984	1	–	3	Las Peñitas, Fuerteventura	28.20 N, 14.00 W
16	14.2.1988	1	–	3	Timanfaya, Parque Nacional de Timanfaya, Lanzarote	29.00 N, 13.50 W
17	13.3.1989	≥1	–	3	Máguéz, Lanzarote	29.09 N, 13.29 W
18	15.9.1990	1	–	2	Montaña Clara	29.18 N, 13.32 W
19	5.3.1997	1	–	3	Amarilla Golf (San Miguel), Tenerife	28.19 N, 16.34 W



Appendix. Continued

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
<b>Cyprus</b>						
21*	4.4.1958	1	-	3	Curium Marsh (= Kourion, Kurion, Kurium)	34.40 N, 32.53 E
<b>Egypt</b>						
22	Winter (1869?)	Occasional	-	-	3	Lower Egypt
23	(1909?)	Fairly common	-	3	Nile Valley	-
24	17.10.1943	1	Scattered reeds and low-growing palms by lake edge	3	Ismailiya (= Ismailia)	30.35 N, 32.16 E
25	19.4.1964	1	-	3	Lake Maryut	31.09 N, 29.54 E
26	19.2.1966	1	-	3	Lake Maryut	31.09 N, 29.54 E
27	8.3.1984	1	-	3	Wadi Kabrit	29.40 N, 33.15 E
28	20.10.1992	≥1	-	3	Hurghada	27.12 N, 33.48 E
<b>Ghana</b>						
29	15.11.1987	1	Old dried-up river bed, densely vegetated with rank grass and shrubs, surrounded by extensively cultivated open-grass savanna with a few scattered trees	2	Tono, 4 km W of Navrongo	10.51 N, 1.05 W
<b>Jordan</b>						
30	3.5.1965	1	-	3	Azraq (= Azraq ash Shishan)	31.50 N, 36.49 E
<b>Mali</b>						
31	12.12.1957	1	Dense vegetation consisting of <i>Leersia hexandra</i> , <i>Echinochloa stagnina</i> and <i>Oryza barthii</i> growing in a large river flood basin in the inundation zone of Niger delta	1	Diengo, Lake Takadji (= Tagadje)	16.00 N, 4.10 W
32	28.12.1975	1	Large rain flood basin with <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> ) in the inundation zone of Niger delta	3	Lake Gossi	15.48 N, 1.19 W
33	8.12.1976	1	Thick solid masses of <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> ), in flooded meadows in the inundation zone of Niger delta	2	Bamako	12.39 N, 8.00 W

## Appendix. Continued

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
34	17.11.1978	1	Mosque enclosure in village surrounded by large moving dunes in Sahara desert	1	Arawan	18.54 N, 3.33 W
35	18.11.1978	1	As above	1	Arawan	18.54 N, 3.33 W
<b>Mauritania</b>						
36	14.9.1972	1	Tamarisk ( <i>Tamarix</i> sp.) thickets running more or less continuously along the landward side of coastal dunes on the coast	3	c. 2 km W of Nouakchott	18.05 N, 15.58 W
37	15.9.1977	1	Inside <i>Papyrus</i> stand in a hotel garden	3	Nouâdhibou (= Nouadhibou)	20.54 N, 17.04 W
38	16.3.1982	1	Garden	3	Nouâdhibou (= Nouadhibou)	20.54 N, 17.04 W
39	18.10.1982	1	Edge of backwater with <i>Tamarix</i> sp. and <i>Phragmites</i> sp.	3	Keur Massène	16.33 N, 16.14 W
40	20.3.1983	1	Garden	4	Baie de Cansado	20.52 N, 17.04 W
41	20.10.1983	1	Edge of the Senegal river and rice plantations	3	Boghé (= Bogue)	16.35 N, 14.16 W
42	22.10.1983	1	As above	3	Kaédi	16.09 N, 13.30 W
43	12.11.1983	1	As above	3	Gouraye	14.55 N, 12.25 W
44	17.10.1986	1	Vast flood basin with multiple belts of vegetation	3	Lac d'Aleg	17.07 N, 13.59 W
45	14.3.1993	1	Sandy offshore bar with <i>Tamarix</i> sp. and <i>Nitraria retusa</i>	4	Nouakchott	18.05 N, 15.59 W
46	21.4.1993	1	Edge of backwater with <i>Tamarix</i> sp. and <i>Phragmites</i> sp.	4	Rosso/Garrak	16.30 N, 15.49 W
47	17.9.1995	1	Sandy offshore bar with <i>Tamarix</i> sp. and <i>Nitraria retusa</i>	4	Nouakchott	18.05 N, 15.59 W
48	26.9.1995	1	Palm plantation with date palms <i>Phoenix dactylifera</i> and <i>Tamarix</i> sp.	4	Toungad	20.03 N, 13.08 W
49	14.10.1995	1	Edge of the Senegal river and rice plantations	4	Kaédi	16.09 N, 13.30 W
50	18.3.1996	1	Edge of backwater with <i>Tamarix</i> sp. and <i>Phragmites</i> sp.	4	Rosso / Garrak	16.30 N, 15.49 W
51	21.4.1996	1	Very small freshwater spring and wetland surrounded by desert	4	N'Séirat	18.02 N, 8.03 W
52	5.9.1996	1	Edge of the Senegal river and rice plantations	4	Boghé (= Bogue)	16.35 N, 14.16 W
53	21.9.1996	1	Sandy offshore bar with <i>Tamarix</i> sp. and <i>Nitraria retusa</i>	4	kilomètre 60	17.35 N, 16.00 W

## Appendix. Continued

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
54	13.10.1996	1	Edge of the Senegal river and rice plantations	4	Koundel (= Koundélé)	15.47 N, 13.16 W
55	13.10.1996	1	As above	4	Sivé (= Civé, Givé)	15.42 N, 13.12 W
56	21.10.1996	1	Vast flood basin with multiple belts of vegetation	4	Lac d'Aleg	17.07 N, 13.59 W
57	21.10.1996	1	As above	4	Lac de Mâl	16.58 N, 13.23 W
58	26.3.1997	1	Border lagoon with relict mangroves <i>Avicennia africana</i> , surrounded by halophilous steppe	4	Cap Timirist (= Râs Timirist)	19.23 N, 16.32 W
59	20.9.1997	1	Sandy offshore bar with <i>Tamarix</i> sp. and <i>Nitroaria retusa</i>	4	Nouakchott	18.05 N, 15.59 W
60	24.9.1997	1	Edge of the Senegal river and rice plantations	4	Boghé (= Bogué)	16.35 N, 14.16 W
61	14.10.1997	1	Flood basin with multiple belts of vegetation, e.g. <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> )	4	Lac R'Kiz	16.50 N, 15.19 W
62	6.11.1997	1	Vast flood basin with multiple belts of vegetation	4	Lac de Mâl	16.58 N, 13.23 W
63	6.11.1997	1	Edge of backwater with <i>Tamarix</i> sp. and <i>Phragmites</i> sp. and some <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> )	4	Rosso/Garrak (= Roco)	16.30 N, 15.49 W
64	17.2.1998	1	Vast rain flood basin	4	Chlim (= Chelim)	16.24 N, 9.03 W
65	6.3.1998	1	Offshore bar with <i>Tamarix</i> sp. and <i>Sesuvium portulacastrum</i>	4	Cap Blanc	20.50 N, 17.04 W
66	21.3.1998	1	Large-sized rain flood basin, with <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> ) and <i>Acacia nilotica</i>	4	Maghmouda	16.27 N, 7.37 W
67	13.9.1998	1	Sandy offshore bar with <i>Tamarix</i> sp. and <i>Nitroaria retusa</i>	4	Port chinois	18.00 N, 15.56 W
68	26.10.1998	1	Edge of the Senegal river and rice plantations	4	Bahabé	16.20 N, 13.57 W
69	19.8.1999	1	Edge of a small and almost drained rain flood basin surrounded by <i>Acacia raddiana</i>	4	Graret Douéminé	19.45 N, 16.05 W
70	18.9.1999	1	Very broad sandy offshore bar with <i>Tamarix</i> sp., <i>Nitroaria retusa</i> and <i>Salvadora persica</i> overhanging fresh water source	4	Chott N'Boul	16.36 N, 16.26 W
71	17.10.1999	1	Vast flood basin with multiple belts of vegetation	4	Lac d'Aleg	17.07 N, 13.59 W
72	9.12.1999	1	Large rain flood basin, with <i>Acacia ataxacantha</i> (= <i>Mimosa pigra</i> ) and <i>Acacia nilotica</i>	4	Maghmouda	16.27 N, 7.37 W
73	5.9.2000	1	Offshore bar with <i>Tamarix</i> sp. and <i>Sesuvium portulacastrum</i>	4	Baie de l'Etoile	21.00 N, 16.55 W

## Appendix. Continued

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
74	5-9-2000	1	Sandy cord with <i>Tamarix</i> sp. and <i>Sesuvium portulacastrum</i>	4	Cap Blanc	20.50 N, 17.04 W
75	4-9-2001	1	Coastal scrub	2	Near Nouakchott	18.05 N, 15.59 W
<b>Morocco</b>						
76	March (1867?)	≥1	—	1	Near Tanger (= Tangier), E Morocco	35.47 N, 5.49 W
77	1.9.1911	1	—	2	Near Essaouira (= Mogador)	31.31 N, 9.46 W
78	Sept. 1954	Numerous	Salt marshes with <i>Salicornia</i> sp. and <i>Tamarix</i> sp.	3	Moulouya estuary, plaine des Trifa, E Morocco	35.06 N, 2.20 W
79	28.9.1954	Numerous	Freshwater marshes with <i>Juncus</i> sp.	3	Ras El Ma, plaine des Trifa, E Morocco	34.59 N, 2.25 W
80	5.10.1954	Numerous	As above	3	Ras El Ma, plaine des Trifa, E Morocco	34.59 N, 2.25 W
81	Feb. 1955	Numerous	Salt marshes with <i>Salicornia</i> sp. and <i>Tamarix</i> sp.	3	Moulouya estuary, plaine des Trifa, E Morocco	35.06 N, 2.20 W
82	27.2.1955	Numerous	Freshwater marshes with <i>Juncus</i> sp.	3	Ras El Ma, plaine des Trifa, E Morocco	34.59 N, 2.25 W
83	3.3.1955	Numerous	As above	3	Ras El Ma, plaine des Trifa, E Morocco	34.59 N, 2.25 W
84	11-17.4.1963	1	Pools of fresh water with cover for birds in oasis lying in a shallow wadi	2	Defilia, 10 km W of Figuig	32.10 N, 1.23 W
85	23-26.8.1966	2	—	1	Essaouira islands (islands near Essaouira = Iles de Mogador)	31.30 N, 9.48 W
86	9-14.9.1966	1	—	1	Essaouira islands (islands near Essaouira = Iles de Mogador)	31.30 N, 9.48 W
87	10.3.1971	1	—	3	Larache	35.12 N, 6.10 W
88	1.3.1972	≥1	—	3	Tangérois, near Tanger (= Tangier)	35.47 N, 5.49 W
89	23.3.1972	1	Meadow	2	Tangérois, near Tanger (= Tangier)	35.47 N, 5.49 W
90	23.3.1972	Numerous	As above	3	Tangérois, near Tanger (= Tangier)	35.47 N, 5.49 W
91	28.3.1972	1	—	3	Tangérois, near Tanger (= Tangier)	35.47 N, 5.49 W
92	16.4.1972	1	—	3	Tangérois, near Tanger (= Tangier)	35.47 N, 5.49 W
93	4.3.1974	1	—	2	Near Settat	33.04 N, 7.37 W
94	7.10.1974	1	—	3	Cape Spartel, near Tanger (= Tangier)	35.47 N, 5.56 W
95	End of March 1977	2	—	4	Wadi Massa (= Oued Massa)	30.05 N, 9.40 W
96	4.4.1979	2	—	2	Near Settat	33.04 N, 7.37 W
97	7.4.1979	1	—	4	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W

Appendix. Continued

ID	Date	Number	Habitat	Rel.	Locality	Coordinates
98	15.4.1979	1	-	2	Near Settat	33.04 N, 7.37 W
99	22.4.1979	1	-	2	Near Settat	33.04 N, 7.37 W
100	2.3.1980	1	Marshes	2	N of Larache ("Lower Loukkos")	35.12 N, 6.10 W
101	4.4.1982	1	-	4	Barrage de Sidi Saïd Maachou	33.10 N, 8.07 W
102	3.10.1982	1	<i>Phragmites</i> sp. in freshwater pond	3	Souk Es-sebt near Wadi Sebou (= Oued Sebou), NW of Fès	34.02 N, 5.00 W
103	7.2.1984	1	-	3	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W
104	18.3.1985	1	Small water pond covered with young <i>Tamarix</i> sp.	2	Marais du Bas-Loukkos (Larache)	35.12 N, 6.10 W
105*	1.2.1987	1	-	4	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W
106	7.4.1988	2	-	4	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W
107	17.2.1989	1	-	4	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W
108*	2.4.1989	1	-	4	Aoulouz, Haut Sous	30.42 N, 8.09 W
109	13.2.1990	>10	-	4	Wadi Massa estuary (= Oued Massa) at Sidi Rbat village	30.05 N, 9.40 W
110	13.2.1990	1	-	2	Wadi Massa estuary (= Oued Massa) at Sidi Rbat village	30.05 N, 9.40 W
111	28.2.1990	1	-	4	Mouth of Wadi Massa estuary (= Oued Massa)	30.05 N, 9.40 W
112	27.3.1996	1	-	3	Mouth of Wadi Souss estuary (= Oued Souss)	30.22 N, 9.37 W
113	29.10.1998	1	-	3	Haha, Tamri	30.42 N, 9.50 W
114	17.4.2003	1	In a dead arm of Wadi Moulouya in <i>Phragmites</i> sp. bordered by tufts of <i>Juncus</i> sp. and <i>Carex</i> sp.	4	E shore of the mouth of the Moulouya estuary	35.06 N, 2.20 W
<b>Senegal</b>						
115	2.3.1972 and 17.3.1972	1	Shallow backwater (c. 1 ha) covered by dense and uniform 40 cm high graminaceous carpet, surrounded by a narrow belt of tamarisks	2	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
116	5.3.1972	2	As above	2	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W

## Appendix. Continued

ID	Date	Number	Habitat	Habitat	Rel.	Locality	Coordinates
117	12.12.1973	≥1	–	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
118	9.2.1974	1	Lightly inundated <i>Juncus</i> -covered meadow	–	2	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
119	March 1974	26	–	–	2	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
120	17.3.1974	≥1	–	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
121	(1982?)	1	–	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
122	28.12.1985	3	–	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
123	6.1.1986	2	in <i>Tamarix</i> sp.	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
124	Feb.1986	1	Dense reeds and tamarisks adjacent to small lake	–	4	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
125	Jan. 1987	1	Guard post near low sedges and some reeds	–	3	Poste de Gainthe, Parc National des Oiseaux du Djoudj	16.24 N, 16.16 W
126	Feb. 1987	1	As above	–	3	Poste de Gainthe, Parc National des Oiseaux du Djoudj	16.24 N, 16.16 W
127	11.3.1987	6	In <i>Tamarix</i> sp.	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
128	Dec. 1987	≥1	Inundated 80 cm high grassy <i>Carex</i> -like associations with scattered <i>Acacia</i> trees, covering several square kilometres	–	2	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
129	Dec. 1987	1	As above	–	3	Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
130	8.2.1993	1	Reed beds	–	2	EM2 ringing site, Parc National des Oiseaux du Djoudj	16.24 N, 16.18 W
<b>Tunisia</b>							
131	25.3.1917	1	–	–	1	Wadi Hamdoune (= Oued Hamdoune), mouth of the beach at Sousse, central Tunisia	35.50 N, 10.38 E
132	20.10.1932	1	–	–	1	Wadi Aouina (= Oued Aouina), Cap Bon	37.05 N, 11.02 E
133	Summer (date?)	1	–	–	3	Edge of Medjerda	36.45 N, 9.00 E
134	22.4.(year?)	≥1	–	–	3	Hamman-Lif	36.40 N, 10.20 E
135	14.4.1949	1	In the scattered reeds in the mouth of a small wadi near the sea	–	3	Gabes	33.53 N, 10.07 E
136*	22.5.1949	1	–	–	3	N of Sousse	35.50 N, 10.38 E
137	8.4.1964	1	Marsh near Medjerdah river mouth	–	4	Utique	37.03 N, 10.04 E
138	7.4.1968	1	–	–	3	Near Anamur, southern coastlands	36.05 N, 32.50 E
<b>Western Sahara</b>							
143	1.9.1962	1	Ship M.V. <i>Joseph Frering</i> on ocean	–	3	Off the coast near Dakhla (= Ad Dakhla)	22.37 N, 17.03 W

## Appendix. Continued

Below we give additional comments and references for each record above. We do not know the sex or age of recorded birds unless indicated below:

(1) Gurney (1871) found *Calamodyta aquaticus* [= *A. paludicola*] between 22 March and 9 April; in our analyses, we use the midpoint of this period, thus making this record a "March" record. (2) Male specimen (BMNH 1951-13-994) collected by Col. W. A. Payn. (3) Observed by Jean-Paul Jacob (in 1985 letter to Paul Isemann) and later mentioned in Ledant *et al.* (1981). (5)–(8) Observed by Jean-Paul Jacob (in 1985 letter to Paul Isemann) and later mentioned in Ledant *et al.* (1981). (9) Recorded by Jean-Paul Jacob in May as mentioned in Ledant *et al.* (1981) but not mentioned in the 1985 letter to Paul Isemann; therefore this record is either an error by Ledant *et al.* (1981) or an oversight by Jean-Paul Jacob in his letter. 1978 is the most likely year for this record given the information in Ledant *et al.* (1981), but it is not definitely stated. (10) Listed as "accidental" in Cramp (1985–1992) and Snow and Perrins (1998) but excluded from our analyses; see text for further details. (11) von Thanner's (1908) observation of *Calamoherpe aquatica* [= *A. paludicola*] was later cited in Bannerman (1920), Stam and Voous (1963) and Martín and Lorenzo (2001). (12) Found dead, but in good condition, by Hugh Cott and subsequently mentioned by Bannerman (1932); later cited in Moreau (1961) and Martín and Lorenzo (2001). (13) Cited in Alamo Tavío (1975) and later in Martín and Lorenzo (2001). (14) This individual had been ringed on 14 August 1981 in Woermer-en Jisperveld Wormer, northern Netherlands (Martín and Lorenzo 2001) and is probably the source for its mention in Martín and Nogales (1993). (15) Recorded by D. R. Collins and cited in Martín and Lorenzo (2001). (16) Recorded by D. Concepción and cited in Martín and Lorenzo (2001) and without details in Concepción (1992). (17) Recorded by D. Concepción and cited in Martín and Lorenzo (2001). (18) This individual had been ringed on 24 August 1990 in Etang de Trunvel, Finistère, France (Martín and Lorenzo 2001). (19) First mentioned by Anonymous (1997) and van den Berg (1997) and later cited in Martín and Lorenzo (2001). (20) Caught by D. Concepción and cited in Martín and Lorenzo (2001). (21) Omitted from the Cyprus list because the description was "too brief to confirm the identification" (Flint and Stewart 1992) and therefore excluded from our analyses; mentioned as a 1956 record in Hüe and Eichéscopar (1970). (22) We give the year of publication as no exact date is given by von Heuglin (1869) for his record of *Acrocephalus aquaticus* [= *A. paludicola*]; later cited in Goodman and Meininger (1989). (23) We give the year of publication as no exact date is given by Whympner (1909) for his listing of *Calamodyta aquatica* [= *A. paludicola*]; this record was overlooked by Goodman and Meininger (1989). (24) Observed by Meiklejohn (1944) and later cited in Goodman and Meininger (1989). (25)–(26) Observed by J. W. Wall and cited in Goodman and Meininger (1989). (27) Observed by S. Howe and D. Merrie and cited in Goodman and Meininger (1989). (28) Recorded by S. Madge/Birdquest and cited in Kirwan (1993). (29) This individual was a juvenile with fresh remiges and rectrices (Hedenström *et al.* 1990; Bensch *et al.* 1991). (30) Recorded by Andrews (1995); this record may originate from I. J. Ferguson-Lees (see Vere Benson 1970, appendix II). (31) Collected by Duhart and Descamps (1963) and later cited in Moreau (1972), Curry and Sayer (1979) and Lamarche (1981). (32) Observed by B. Lamarche (*in litt.* 2004) and cited in Lamarche (1981). (33) Caught by B. Lamarche (*in litt.* 2004) and cited in Curry and Sayer (1979). Lamarche (1981) and Mayaud (1990), erroneously cited as a "1973" record in Curry and Sayer (1979). (34)–(35) These two individuals were found dead, but in fresh condition, by B. Lamarche (*in litt.* 2004) and cited in Lamarche (1981) and Mayaud (1990). (36) Observed by John P. Gee (*in litt.* 2004) as the individual was moving south with large numbers of other migrants, cited in Gee (1984) and Lamarche (1988). (37) Observed "in the interior court of a hotel while strong winds reigned outside" by B. Lamarche (*in litt.* 2004). (38) Observed by Mahé (1985) and later cited in Lamarche (1988); additional details provided by B. Lamarche (*in litt.* 2004). (39) Observed by B. Lamarche (*in litt.* 2004) and later cited as "Delta" record in Lamarche (1988). (40) Observed by B. Lamarche (*in litt.* 2004). (41) Observed by B. Lamarche (*in litt.* 2004) and later cited as "Boghé" record in Lamarche (1988). (42) Observed by B. Lamarche (*in litt.* 2004) and later cited as "Kaédi" record in Lamarche (1988). (43) Observed by B. Lamarche (*in litt.* 2004) and later cited as "moyenne vallée" record in Lamarche (1988). (44) Observed by B. Lamarche (*in litt.* 2004) and later cited as "Aleg" record in Lamarche (1988). (45)–(74) Observed by B. Lamarche (*in litt.* 2004). (75) Caught by V. Salewski (*in litt.* 2004). (76) We give the year of publication as no exact date is given by Drake (1867) for his collection of *Salicaria aquatica* [= *A. paludicola*] although his statement that the observation was made "during my stay there from January to the beginning of April last" suggests 1866; later cited in Heim de Balsac and Mayaud (1962) and Thévenot *et al.* (2003). (77) Lozano's (1911) record was later cited in Moreau (1961), Heim de Balsac and Mayaud (1962) and Thévenot *et al.* (2003). (78)–(83) Brosset's (1956, 1961) observations were later cited in Heim de Balsac and Mayaud (1962) and Thévenot *et al.* (2003). (84) Netted by E. D. H. Johnson and reported in Smith (1968) who gives the period from 11 to 17 April for its

## Appendix. Continued

capture, while Thévenot et al. (2003) give the exact date of 15 April, possibly gathered from the original ringing data (M. Thévenot and R. Vernon in litt. 2004). (85)–(86) Prey remains found by Walter (1968) around Eleonora's falcon *Falco eleonorae* nests, later cited in Thévenot et al. (2003); the coordinates that Walter gave were those of the city of Mogador (= Essouira) and not the "Îles de Mogador" where the remains were found. (87) Observed by Pineau and Giraud-Audine (1974); additional details provided by M. Thévenot (in litt. 2004). (88)–(92) Observed by Pineau and Giraud-Audine (1974) who on 23 March also caught and photographed one individual, later cited in Pineau and Giraud-Audine (1979) and Mayaud (1990) who extended the period of observational records to 1 March; additional details provided by M. Thévenot (in litt. 2004). (93) Caught by Thouy (1978) and later erroneously cited as an "April" record in Mayaud (1990). (94) Observed by Pineau and Giraud-Audine (1975), later cited in Pineau and Giraud-Audine (1979) and Thévenot et al. (2003). (95) Recorded by Rod Martins (in litt. 2004). (96) Caught by Thévenot et al. (1980). (97) Observed by T.A. Walsh and Steve Whitehouse (M. Thévenot and R. Vernon in litt. 2004). (98) Caught by Thévenot et al. (1980). (99) Caught by P. Thouy (Thévenot et al. 2003) and cited in Thévenot et al. (1980). (100) Caught by Pierre Ch. Beaubrun (M. Thévenot in litt. 2004) and cited in Thévenot et al. (1981, 2003). (101) Observed by Jean-Paul Julliard (M. Thévenot in litt. 2004). (102) Observed by R. Destre and B. Libis (M. Thévenot in litt. 2004) and cited in Thévenot et al. (1980) as "near Fes" record. (103) Observed by J. Vestergaard-Jensen (M. Thévenot in litt. 2004) and cited in Thévenot et al. (1980) as earliest February record. (104) Caught by Jacques Franchimont (M. Thévenot in litt. 2004). (105) Observed by Christopher Bowden (M. Thévenot in litt. 2004) but not accepted by Moroccan Rare Birds Committee (Bergier et al. 2000), and therefore excluded from our analyses. (106) Observed by Alan Brown (M. Thévenot in litt. 2004). (107) Observed by Dave J. Odell (M. Thévenot in litt. 2004). (108) Mark Piper recorded a singing male as "Sedge Warbler *Acrocephalus paludicola*"; therefore this record is highly doubtful (M. Thévenot in litt. 2004) and was thus excluded from our analyses. (109) Observed by Marten Ajne et al. (M. Thévenot in litt. 2004). (110) Caught by Marten Ajne et al. (M. Thévenot in litt. 2004). (111) Observed by J. Komi, T. Lindrous, T. Missonen and H. Nurmi (M. Thévenot in litt. 2004). (112) Observed by Ian Rowlands (M. Thévenot in litt. 2004) and cited in Anonymous (1996). (113) First-winter bird observed by C. Edginton and D. Walsh (M. Thévenot and R. Vernon in litt. 2004) and cited in Bergier et al. (2000, 2002) and Thévenot et al. (2003). (114) Observed by Benoît Maire, submitted and accepted by the Moroccan Rare Birds Committee as observation no. 2003/06 (M. Thévenot in litt. 2004). (115) Caught on 2 March and retrapped on 17 March by Jarry and Larigauderie (1974) and cited in Morel and Roux (1973), Isenmann (1979) and Rodwell et al. (1996). (116) Caught by Jarry and Larigauderie (1974) and cited in Morel and Roux (1973), Isenmann (1979) and Rodwell et al. (1996). (117) and (120) About 50 individuals were recorded in the time period from 12.12.1973 to 17.3.1974, including the 26 ringed individuals mentioned in record 119 (Karl Schulze-Hagen, personal communication in Rodwell et al. 1996). (118) Caught by G. Jarry (in litt. to Isenmann 1979), but curiously not mentioned in later publications. (119) Caught by the CRBPO (François Baillon in litt. 1989) and cited in Schulze-Hagen (1993) and Rodwell et al. (1996). (120) See record 117. (121) We give the year of publication as no exact date is given by Jarry and Roux (1982) as cited in Rodwell et al. (1996). (122) Recorded by François Baillon (in litt. 1989) and cited in Schulze-Hagen (1993). (123) Observed by François Baillon (in litt. 1989) and cited in Schulze-Hagen (1993). (124) Recorded by Matthias Scholten (personal communication from Christopher Schmidt). (125)–(126) Recorded by Rodwell et al. (1996); additional details provided by Stephen Rumsey (in litt. 2004). (127) Observed by François Baillon (in litt. 1989) and cited in Schulze-Hagen (1993). (128) Caught by Hermann Hörker (in litt. 1989) and cited in Schulze-Hagen (1993). (129) Observed by Hermann Hörker (in litt. 1989) and cited in Schulze-Hagen (1993). (130) Caught by Rodwell et al. (1996); additional details provided by Stephen Rumsey (in litt. 2004). (131) Specimen mentioned in Blanchet (1955) and later cited in Heim de Balsac and Mayaud (1962) and Thomsen and Jacobson (1979). (132) Male specimen mentioned in Blanchet (1955) and later cited in Heim de Balsac and Mayaud (1962) and Thomsen and Jacobson (1979). (133) Recorded by J. I. S. Whitaker and cited without giving an exact date of record in Heim de Balsac and Mayaud (1962). (134) Recorded by A. Koenig and cited without giving year of record in Heim de Balsac and Mayaud (1962). (135) Observed by Lombard (1965) and later cited in Thomsen and Jacobson (1979). (136) Record attributed to Lombard (1965) in Thomsen and Jacobson (1979), but not mentioned in Lombard (1965), and therefore excluded from our analyses. (137) Recorded by Mike Smart (personal communication). (138) Recorded by Brathay Exploration Group and cited in Thomsen and Jacobson (1979). (139)–(140) Recorded by Guy Jarry, CRBPO (personal communication from Mike Smart). (141) Recorded by K. Frost Larsen and cited in Thomsen and Jacobson (1979). (142) Observed by Kirwan (1992) and later cited in Kirwan (1995). (143) Observed by Captain D. Stam on board the M.V. *Joseph-Frering* (Stam and Voous 1963) and later cited in Tuck (1964), Moreau (1972), and as an undated record "off Dakhla" in Urban et al. (1997).